were obtained, has been examined as to its method of progression, Figure 4. It is that of the ordinary snail, the under side of the foot being in total contact with the surface over which it moves. Observed from the under side when the animal is actively crawling over a surface of glass, the foot is seen to be extended to a length of 20 mm., or, including the labial tentacles and head segment, 24 mm.; the tentacles may be protruded about 8 mm. more. The foot proper shows a central muscular portion extending its entire length, about 3 mm. wide anteriorly and tapering to less than 1 mm. wide posteriorly; it is bounded for its entire length on each side by an area that corresponds to the edge of the foot on which the above operculates move. This has apparently the structure of the upper surface of the foot and is not involved in the muscular contractions during locomotion; it does not appear to be traversed by the contractile muscles. When the under side of the foot is observed during active motion of the animal, the middle band of the foot is seen to contract in a series of waves which traverse the length of the foot in about 10 seconds, or at a rate of 2 mm. per second. These waves follow each other closely; there are about 50 to 60 waves per minute. They move from the anterior to the posterior end of the foot, in the reverse direction of the wave movement described above for the other species. The foot is not so firm as in the above species, and while the operculum is placed under the shell it does not support it, as in the case of *Colobostylus*, *Tudora* and *Adamsiella*. The motion is perfectly even, rather slow, and of course there is no swaying of the shell from side to side which is so characteristic of the other species described.

The movement of *Stoastoma pisum* (C. B. Ad.) resembles that of the above species of *Colobostylus*, *Tudora*, etc., and it has undoubtedly been observed (though not described), for Chitty gives a figure of this species crawling which shows plainly the raised margin of the foot, due to the passage of the wave. The figure is unaccompanied by any description of this character of the animal.

NOTES ON SOME LAND SNAILS FROM KENTUCKY.

BY V. STERKI.

On September 25th last I had a few hours to look for snails at Maysville, Mason Co., Ky., in the Ohio Valley. The place was the steep northeast slope of a limestone hill and on its top, for the most

part wooded and with thick underbrush and tall annuals. On the 26th Dr. Ortmann and I collected for two hours at Pleasant Valley, Nicholas Co., Ky., in the Licking Valley, on a steep, rocky southeast slope, also limestone. At both places I had no chances to look for minutiae, could do no sifting and brushing. The list of species found is naturally short, and is given below for two reasons: probably no collecting has been done there before, and there were a few interesting forms on which some notes are added. It may be noted, by the way, that all of the *Polygyræ* found were represented at Pleasant Valley—truly pleasant to the conchologist—certainly a large number found on a small spot and in a short time of hurried collecting. In the notes, M stands for Maysville and P for Pleasant Valley.

Gastrodonta ligera Say. Abundant at M, especially on a loose, old stone wall, a large form, the shells whitish in some specimens, vividly yellow towards the aperture on others. Less common at P, much smaller, the spire higher, and in most specimens dome-shaped.

Omphalina inornata Say. At P, not common.

Omphalina lævigata perlævis Pils. Shell more depressed than that of the common form and smaller; color amber, paler at the base, reddish above; with the soft parts in the shell, the latter appears somewhat olive beneath and brownish above; the radial striæ above are slighter, less sharp, subregular, and there are no revolving lines; the nucleus has the same striæ, regular, and coarser than those on the upper part of the post-embryonal shell; diam. 17, alt. (total) 11 mill.; in other exs. 15 and 9 mill.; the radula has 29 transverse rows of m + 18(19) teeth, and there are no perfect admedian, as described by W. G. B. All specimens were alike except for differences in size.

Pleasant Valley, Nicholas Co., Kentucky. The snail has not the appearance of *O. lævigata*, rather that of *inornata*, for which it was mistaken at first sight; but the umbilicus is somewhat wider, and there are other differences, as noted. It agrees in the main with *O. l. perlævis*, though the color is different.

Hyalina indentata Say. One specimen at M.

Agriolimax campestris Binney. At both places.

Circinaria concava Say. Abundant at both places, larger at M.

Patula alternata Say. Common at M, large; less common and smaller at P.

Polygyra albolabris Say. A few specimens at P.

P. zaleta Binney. Not rare at P, mostly empty shells of decidedly

different forms. One specimen, a dead shell, which may be of the same, is high, globose, diam. 25, alt. 21 mill., with the last whorl considerably descending towards the aperture, and the latter quite inferior and oblique, somewhat triangular, like that of *P. elevata*, but there are only a little over six whorls, and the spire is less conical.

P. thyroides Say. Common at both places, abundant on the hill-top at M; rather large, with strong shell and lip.

P. pennsylvanica Green. A few at P, shell rather high.

P. mitchelliana Lea. One at P, found by Dr. Ortmann.

P. palliata Say. A few at P.

P. appressa Say. Common at M, mostly young; abundant at P, mostly dead shells.

P. inflecta Say. Common at P, quite small, diam. 9.5–10.5 mill.; color from light to brownish.

P. tridentata juxtidens Pils. Common at P, small, with a narrow umbilicus, strong lip and high parietal lamina; the curve between the upper and lower " teeth " of the peristome is narrow and rather angular at the periphery, and in most specimens there is an additional thin lamella extending downward and inward from the upper tooth. From its whole configuration this form appears to represent a variety.

P. fraterna Say. At both places. In some specimens the umbilicus is covered or nearly so, in others rather open, and the base around the umbilicus is rather excavated, as in *P. monodon* (*leai*). The surface of all is finely and densely hirsute, and the color is light brown.

P. stenotrema Fér. Common at P. There are two forms, one of them with a large notch in the peristome, and also otherwise different, as also seen from other places; a few notes on them will follow.

Bifidaria contracta Say. One at M.

B. tappaniana Ad. One at M.

NOTES ON ORIENTAL UNIONIDÆ.

BY L. S. FRIERSON.

The following notes are offered as so many "addenda et corrigenda" to Mr. Chas. T. Simpson's great work, " The Synopsis of the Naiades: "